

# DEPARTMENT OF MATHEMATICS

## Undergraduate Degree(s):

- Bachelor of Science in Mathematics (<https://catalog.tsu.edu/undergraduate/schools-colleges/science-engineering-technology/mathematics/mathematics-bs/>)
- Mathematics (Data Science Concentration), Bachelor of Science (<https://catalog.tsu.edu/undergraduate/schools-colleges/science-engineering-technology/mathematics/mathematics-data-science-concentration-bs/>)

## Minor(s):

- Data Science Minor (<https://catalog.tsu.edu/undergraduate/schools-colleges/science-engineering-technology/mathematics/data-science-minor/>)
- Mathematics (<https://catalog.tsu.edu/undergraduate/schools-colleges/science-engineering-technology/mathematics/mathematics-minor/>)

## Certificate(s):

- Data Science Certificate (<https://catalog.tsu.edu/undergraduate/schools-colleges/science-engineering-technology/mathematics/data-science-certificate/>)

## Graduate Degree(s):

- Accelerated Master of Science- Mathematics (5-year BS to MS) (<https://catalog.tsu.edu/undergraduate/schools-colleges/science-engineering-technology/mathematics/accelerated-master-of-science-mathematics-bs-to-ms/>)

As one of the largest instructional units in the University, the Department of Mathematical Sciences offers courses in Mathematics (MATH) for the matriculation of a Bachelor of Science (B.S.) Degree in Mathematics, a Data Science concentration, a Certificate in Data Science, and a minor in Mathematics, and a minor in Data Science for students majoring in other academic disciplines at the University.

The Department provides major support to the overall undergraduate curriculum at Texas Southern University since every undergraduate degree or program of study requires the completion of at least three semester credit hours in Mathematics for graduation. Instructional facilities and the Department Office (Room 111K) are located on the first floor of the Science Building. Faculty members are also housed on the first floor of the Science Building.

The mission of the Department of Mathematics is to make all students who matriculate through Texas Southern University aware of the role that Mathematics plays in the modern world and to allow them to develop sufficient skills in utilizing the processes and techniques of Mathematics to pursue their chosen fields of study, as well as to deal with mathematical processes on a daily basis. In the realization of this mission, students are prepared for a variety of careers, for negotiating the rigors of various curricula of study that are heavily dependent upon the understanding of mathematical processes, and for graduate study and research.

The goals of the Mathematics program are the following:

- The graduate will have developed learning skills and acquired a firm foundation of knowledge of fundamental mathematical concepts, methods, reasoning and language sufficient to support further academic work or a career in area that requires mathematical understanding.
- The graduate will exhibit understanding of advanced mathematical concepts and analytical skills, and also utilize appropriate technology to develop models for solving problems and analyzing new situations, both in mathematics and in areas that use mathematics.

The Mathematics program Student Learning Outcomes are to:

- The student will exhibit understanding of advanced mathematical concepts and analytical skills.
- The student will master the essentials of calculus sufficiently to apply those skills in more advanced mathematics classes.
- The student will use mathematical modeling to solve problems from fields such as natural sciences, social sciences, business and engineering.
- The student will apply knowledge relating to set theory, functions, and equivalence relation to advanced mathematics courses.
- The student will write mathematical proofs when required in upper level and advanced mathematics courses.
- The student will understand the concepts of random variable, distribution functions, and theoretical versus, simulated probability and apply them to real world situations.

Requirements for both the B.S. in Mathematics and the minor in Mathematics are summarized below.

Students wishing to pursue either a major (B.S.) or minor in Mathematics must first be admitted to the University, must satisfy TSI Assessment requirements, must eradicate deficiencies assessed at the time of admission through the University Testing Center, and must petition the Department for admission as TSI Assessment requirements or equivalent are completed. Once admitted to the Department, students are assigned an official advisor who must be consulted on a semester or term basis for schedule approval and status verification for progression toward graduation.

**All completed Mathematics courses that are designated for a major in Mathematics must be completed with a grade of "C" or better. Grades of "C-" are unacceptable.**

In selecting a minor, Mathematics majors should seek detailed advisement from their designated advisors because the selection of a minor having representative courses in the core curriculum of study could impact the total number of credits required.

**All courses taken in fulfillment of a minor in a non-mathematics discipline by a student pursuing a B.S. in Mathematics must be completed with a grade of "C" or better, where grades of "C-" are unacceptable.** This is also the case for students in other disciplines seeking the minor in Mathematics.

In no case will students qualify for graduation at the undergraduate level with fewer than 120 semester credit hours satisfactorily completed.

**An exit examination is required of all graduating seniors pursuing the B.S. in Mathematics.**

All students pursuing a minor in Mathematics must have a cumulative average of “C” or better in the courses required for the minor. In no case will a student be granted a minor in Mathematics with fewer than 20 semester credit hours satisfactorily completed.

Individuals interested in seeking certification for teaching Mathematics in the public schools of Texas should contact the Teacher Certification Officer in the College of Education at Texas Southern University for application instructions. Mathematics courses used in the certification process must be approved through the Department.

**Minor in Mathematics**, click here (<https://catalog.tsu.edu/undergraduate/schools-colleges/science-engineering-technology/mathematics/mathematics-minor/>).

ACCELERATED MASTER OF SCIENCE – MATHEMATICS (5-year BS to MS)

### AIMS AND OBJECTIVES

The mathematics undergraduate students at TSU will have an opportunity to complete the BS and MS degrees at accelerated pace in five years, and the Accelerated MS Program will create a pipeline of students going to Ph.D. granting institutions.

### ADMISSION REQUIREMENTS

- Students must have a minimum accumulated grade point average of 3.0/4 at TSU,
- Students must have a minimum cumulative GPA of 3.0 in mathematics major courses,
- Students' grades must be posted for all 200 and 300 level required math courses,
- Students must complete at least 94 credits in the mathematics degree plan, and
- Students must not have more than two semesters left in undergraduate program at time of admission to the masters' program.
- Transfer students must have completed a minimum of a two full-time semesters and 24 hours at TSU.

Selected undergraduate students may begin taking graduate courses during their senior year, earning 6 graduate mathematics hours that can be counted toward both the BS in Mathematics and the MS in Mathematics degree.

Applications cannot be evaluated until these requirements are met and the Graduate School receives the completed application. The entire admission process will be under the direction of the Graduate Faculty Committee in the Department of Mathematics and the Graduate Council in the Graduate School at the University.

- Accelerated Master of Science- Mathematics (5-year BS to MS) (<https://catalog.tsu.edu/undergraduate/schools-colleges/science-engineering-technology/mathematics/accelerated-master-of-science-mathematics-bs-to-ms/>)
- Data Science Certificate (<https://catalog.tsu.edu/undergraduate/schools-colleges/science-engineering-technology/mathematics/data-science-certificate/>)
- Data Science Minor (<https://catalog.tsu.edu/undergraduate/schools-colleges/science-engineering-technology/mathematics/data-science-minor/>)

- Mathematics (Data Science Concentration), Bachelor of Science (<https://catalog.tsu.edu/undergraduate/schools-colleges/science-engineering-technology/mathematics/mathematics-data-science-concentration-bs/>)
- Mathematics Minor (<https://catalog.tsu.edu/undergraduate/schools-colleges/science-engineering-technology/mathematics/mathematics-minor/>)
- Mathematics, Bachelor of Science (<https://catalog.tsu.edu/undergraduate/schools-colleges/science-engineering-technology/mathematics/mathematics-bs/>)

## Mathematics Courses

### MATH 101 Interdisciplinary Math Lab (0 Credits)

**Lecture:** 0, **Lab:** 0

NON-COURSE BASE INTERVENTION: MATHEMATICS Help student develop skills, strategies and reasoning required to succeed in mathematics. Include the study of numeracy and real number system; algebraic concepts, notation and reasoning; quantitative relationships; mathematical models and problem solving. Co-Requisite: MATH 132, MATH 133 or MATH 135.

**College/School:** Col of Science, Engr & Tech

**Department:** Department of Mathematics

### MATH 130 Fundamental Math (3 Credits)

**Lecture:** 3, **Lab:** 0

Fundamental Math (3) Designed to provide students with the concepts and skills necessary for successful performance in college level mathematics. Assists students in passing state-required tests. Provides the academic foundation for success in MATH 131. Three hours of lecture and one hour of laboratory per week.

**College/School:** Col of Science, Engr & Tech

**Department:** Department of Mathematics

### MATH 130L Fundamental Math Lab (0 Credits)

**Lecture:** 0, **Lab:** 0

**College/School:** Col of Science, Engr & Tech

**Department:** Department of Mathematics

### MATH 131 Developmental Ed Math II (3 Credits)

**Lecture:** 3, **Lab:** 0

Analytical Math (3) Designed to provide students with the necessary mathematical foundation to pass freshman level mathematics courses. Assists students in passing state-required tests. Three hours of lecture and one hour of laboratory per week.

**College/School:** Col of Science, Engr & Tech

**Department:** Department of Mathematics

### MATH 131L Analytical Math Lab (0 Credits)

**Lecture:** 0, **Lab:** 0

**College/School:** Col of Science, Engr & Tech

**Department:** Department of Mathematics

**MATH 134 Plane Trigonometry (3 Credits)****Lecture:** 3, **Lab:** 0

Plane Trigonometry (3) Definitions and relations of the six trigonometric functions, proofs of formulas, solutions of triangles, trigonometric identities and equations, inverse trigonometric functions. Three hours of lecture per week. Prerequisites: MATH 133 and a passing score on the mathematics portion of the ASSET Examination. Listed as MATH 1316 in the Texas Common Course Numbering System.

**Prerequisite(s):** ( or or or TSI Exemption TAKS with a score of 2200 or TSI MATH Assessment with a score of 350 or or C-Better Math Resident Stu with a score of 2.00 or C-Better Math Transfer Stu with a score of 2.0) or ( and MATH 101 (may be taken concurrently) or MATH 131 or HCCM 131) or (TSI MATH Assessment with a score of 910 and Adult Basic Education MATH with a score of 6) or TSI MATH Assessment with a score of 950

**College/School:** Col of Science, Engr & Tech**Department:** Department of Mathematics**TCCN:** MATH 1316**MATH 232 Software Scientific Computing (3 Credits)****Lecture:** 3**College/School:** Col of Science, Engr & Tech**Department:** Department of Mathematics**MATH 243 Calculus & Analytic Geo III (4 Credits)****Lecture:** 4

Calculus and Analytic Geometry III (4) Sequences, infinite series, conic sections, polar coordinates, two-dimensional and three-dimensional vectors, parametric equations, partial differentiation, and multiple integrals. Four hours of lecture per week. Prerequisite: MATH 242.

**Prerequisite(s):** (MATH 242 or MATH 2414)**College/School:** Col of Science, Engr & Tech**Department:** Department of Mathematics**MATH 251 Differential Equations (3 Credits)****Lecture:** 3

Differential Equations (3) Important methods of solution of ordinary differential equations of the first order and of higher orders with applications to geometry and physics. Three hours of lecture per week. Prerequisites: MATH 242 and MATH 243. (MATH 243 may be taken concurrently.)

**Prerequisite(s):** (MATH 242 or MATH 2414)**College/School:** Col of Science, Engr & Tech**Department:** Department of Mathematics**MATH 252 Intro to Operations Research (3 Credits)****Lecture:** 3**College/School:** Col of Science, Engr & Tech**Department:** Department of Mathematics**MATH 331 Foundations of Mathematics (3 Credits)****Lecture:** 3, **Lab:** 0

Foundations of Mathematics (3) Transitional mathematics course toward the study of advanced mathematics. Various topics in the foundations of mathematics discussed. Three hours of lecture per week. Prerequisite: MATH 241.

**Prerequisite(s):** MATH 241**College/School:** Col of Science, Engr & Tech**Department:** Department of Mathematics**MATH 332 Introduction to Graph Theory (3 Credits)****Lecture:** 3

Graph theory has been applied to many fields including other branches in mathematics, chemistry, biology and so on. With the current intensive interests in network systems, graph theory becomes even more popular. This course introduces some major topics in graph theory. More specifically, it discusses degrees, isomorphic graph, trees, connectivity, traversability, coloring graphs. If time allows, we will also discuss digraph, matching and factorization.

**Prerequisite(s):** (MATH 331)**College/School:** Col of Science, Engr & Tech**Department:** Department of Mathematics**MATH 335 Foundations Of Geometry (3 Credits)****Lecture:** 3, **Lab:** 0

Foundations of Geometry (3) Logic and postulates relating to geometries. Modern plan geometry as developed from Euclidean geometry, measurement, and metric system. Properties of geometric figures, congruence, theory of parallel lines, and noneuclidian geometry. Three hours of lecture per week. Prerequisite: MATH 241.

**Prerequisite(s):** MATH 241**College/School:** Col of Science, Engr & Tech**Department:** Department of Mathematics**MATH 336 Introduction to Abstract Algebra (3 Credits)****Lecture:** 3, **Lab:** 0

Int to Abstract Algebra (3) Introduction to mathematical systems such as groups, rings, and fields. Three hours of lecture per week. Prerequisites: MATH 331.

**Prerequisite(s):** (MATH 331)**College/School:** Col of Science, Engr & Tech**Department:** Department of Mathematics**MATH 345 Applied Mathematics and Statistics for Scientists and Engineers (3 Credits)****Lecture:** 3

Applied Mathematics and Statistics for Scientists and Engineers (3) Selected topics in applied differential equations (including transform techniques), linear programming, numerical methods, and statistics with emphasis on applications to the solution of problems in science and engineering. Three hours of lecture per week. Prerequisite: MATH 242.

**Prerequisite(s):** MATH 242 or MATH 2414**College/School:** Col of Science, Engr & Tech**Department:** Department of Mathematics**MATH 376 Applied Mathematical Analysis (3 Credits)****Lecture:** 3, **Lab:** 0

Applied Mathematical Analysis (3) Vector analysis; algebra and geometry of vectors; vector differential and integral calculus; theorems of Green, Gauss, and Stokes. Three hours of lecture per week. Prerequisite: MATH 314.

**Prerequisite(s):** MATH 243**College/School:** Col of Science, Engr & Tech**Department:** Department of Mathematics**MATH 430 The History Of Mathematics (3 Credits)****Lecture:** 3, **Lab:** 0

The History of Mathematics (3) General view of the development of the elementary branches of mathematics; growth of higher mathematics in the eighteenth and nineteenth centuries. Three hours of lecture per week. Prerequisite: Twelve credits of college mathematics.

**College/School:** Col of Science, Engr & Tech**Department:** Department of Mathematics

**MATH 431 Software for Scientific Computing (3 Credits)****Lecture:** 3, **Lab:** 0

This course introduces some of the high-level computing languages and software that are widely used in industry and universities. These software are extremely efficient on matrix operations, and also they focus on numerical computing in interactive environment. In this course, we focus on introducing MATLAB and R language, and give a brief tour of Mathematics. The aim of the course is to have students to learn what these three pieces of software can do and how they can use the tools for their own computing purposes.

**Prerequisite(s):** (MATH 136 and MATH 231)**College/School:** Col of Science, Engr & Tech**Department:** Department of Mathematics**MATH 433 Concepts Structure Of Math (3 Credits)****Lecture:** 3, **Lab:** 0

Concepts and Structure of Mathematics (3) Structure of the number system, elements of set theory, properties of real numbers, and basic concepts of mathematical systems. Presented for nonmajors. Three hours of lecture per week. Prerequisite: Consent of the instructor.

**College/School:** Col of Science, Engr & Tech**Department:** Department of Mathematics**MATH 437 A Surv of Math Ideas (3 Credits)****Lecture:** 3

Contemporary Mathematics and Its Applications (3) Applications of various mathematical topics and mathematical needs of people in some of the trades, professions, and scientific disciplines. Three hours of lecture per week. Prerequisite: MATH 314 or consent of the instructor.

**Prerequisite(s):** MATH 243**College/School:** Col of Science, Engr & Tech**Department:** Department of Mathematics**MATH 439 Introduction to Analysis (3 Credits)****Lecture:** 3, **Lab:** 0

Introduction to Analysis (3) The real number system; elementary point set theory; sequences and series; continuity; possibly topics from differentiation and integration. Three hours of lecture per week. Prerequisites: MATH 243 and MATH 331.

**Prerequisite(s):** (MATH 243 and MATH 331)**College/School:** Col of Science, Engr & Tech**Department:** Department of Mathematics**MATH 460 Intro To Complex Analysis (3 Credits)****Lecture:** 3, **Lab:** 0

Introduction to Complex Analysis (3) Complex numbers and complex geometry; limits, continuity, derivatives, and the Cauchy-Riemann equations; analytic and harmonic functions; Cauchy's Integral Theorem and its consequences. Three hours of lecture per week. Prerequisites: MATH 314 and MATH 331.

**Prerequisite(s):** (MATH 243 and MATH 331)**College/School:** Col of Science, Engr & Tech**Department:** Department of Mathematics**MATH 461 Introduction to Partial Differential Equations (3 Credits)****Lecture:** 3

Linear Operators: Linear first order equations; the wave equation; the heat equation; Laplace's Equation; Green's Function and Sturm-Liouville problems; Fourier Series; Numerical Solutions. Three hours of lecture per week.

**Prerequisite(s):** (MATH 251)**College/School:** Col of Science, Engr & Tech**Department:** Department of Mathematics**MATH 462 Intro To Topology (3 Credits)****Lecture:** 3, **Lab:** 0

Introduction to Topology (3) Topics include metric spaces, connectedness, and compactness. The topology of Euclidean spaces discussed in detail as well as its generalization to nonmetric topological spaces. Three hours of lecture per week. Prerequisites: MATH 314 and MATH 331.

**Prerequisite(s):** (MATH 243 and MATH 331)**College/School:** Col of Science, Engr & Tech**Department:** Department of Mathematics**MATH 463 Introduction to Numerical Analysis (3 Credits)****Lecture:** 3

Computer Arithmetic and associated error analysis. Solution of non linear equations. Interpolation and approximation methods. Numerical differentiation and integration. Initial value problems for ordinary differential equations. Three hours of lecture per week.

**Prerequisite(s):** (MATH 242)**College/School:** Col of Science, Engr & Tech**Department:** Department of Mathematics**MATH 465 Introduction to Data Science and Machine Learning (3 Credits)****Lecture:** 3

This course introduces theory and applications for statistics learning techniques including linear and logistic regression, classification and regression trees, random forests and neural networks. R programming will be used throughout the course.

**Prerequisite(s):** MATH 3339**College/School:** Col of Science, Engr & Tech**Department:** Department of Mathematics**MATH 466 Introduction to Data Science and Statistics Learning (3 Credits)****Lecture:** 3

This course introduces theory and applications for statistics learning techniques including maximal marginal classifiers, support vector machines, K-means and hierarchical clustering, and re-sampling methods. R programming will be used throughout the course. Prerequisite(s): MATH 465

**Prerequisite(s):** (MATH 465 or MATH 3339)**College/School:** Col of Science, Engr & Tech**Department:** Department of Mathematics**MATH 467 Biostats (3 Credits)****Lecture:** 3

This course is intended as comprehensive concepts-centric biostatistics primer. Those who complete the course will be able to read and respond to the scientific literature, including the Methods and Results sections, biological science, and related fields. Successful learners will also be prepared to participate as part of a research team in biological science and related fields. R programming will be used throughout the course. Prerequisite(s): One year of college math, BIOL 132, BIOL 111 or instructor consent.

**Prerequisite(s):** BIOL 132 and BIOL 111**College/School:** Col of Science, Engr & Tech**Department:** Department of Mathematics**MATH 471 Topics In Math I (3 Credits)****Lecture:** 3, **Lab:** 0

Topics in Mathematics I (3) New developments and trends in mathematics discussed. Three hours of lecture per week. Prerequisite: Consent of the instructor.

**College/School:** Col of Science, Engr & Tech**Department:** Department of Mathematics



**MATH 473 Probability & Statistics I (3 Credits)****Lecture:** 3, **Lab:** 0

Probability and Statistics I (3) Introduction to probability and statistical inference making use of the calculus developed in MATH 241 and MATH 242. Three hours of lecture per week. Prerequisite: MATH 242.

**Prerequisite(s):** MATH 242 or MATH 2414**College/School:** Col of Science, Engr & Tech**Department:** Department of Mathematics**MATH 474 Probability & Statistics II (3 Credits)****Lecture:** 3, **Lab:** 0

Probability and Statistics II (3) Moments of distributions and Stieltjes integral; joint density functions; conditional means; moment generating functions; sequences of random variables; distribution theory; and hypothesis testing. Three hours of lecture per week. Prerequisite: MATH 473.

**Prerequisite(s):** MATH 473**College/School:** Col of Science, Engr & Tech**Department:** Department of Mathematics**MATH 475 Abstract Algebra (3 Credits)****Lecture:** 3, **Lab:** 0

Abstract Algebra (3) Group theory; Lagrange's Theorem; Isomorphism Theorem; Cayley's Theorem; rings and fields. Three hours of lecture per week. Prerequisite: MATH 336.

**Prerequisite(s):** MATH 336**College/School:** Col of Science, Engr & Tech**Department:** Department of Mathematics**MATH 490 Independent Study Undergrad (3 Credits)****Lecture:** 3, **Lab:** 0

Independent Study: Undergraduate (3) Intensive study of a topic in mathematics under the direction of a faculty member. Prerequisites: Senior standing and consent of the instructor.

**College/School:** Col of Science, Engr & Tech**Department:** Department of Mathematics**MATH 498 Capstone Courses in Math (3 Credits)****Lecture:** 3

This course will combine ideas from different areas of mathematics with emphasis on current topics of interest and serve as a capstone course for all mathematics majors. topics vary at instructor's discretion. The course will include student presentations, written projects, mathematical reasoning, problem solving and senior exit exam. Required of all mathematics majors. Pre-Requisite Math 331 and senior standing.

**Prerequisite(s):** MATH 331**College/School:** Col of Science, Engr & Tech**Department:** Department of Mathematics**MATH 499 Seminar (3 Credits)****Lecture:** 3, **Lab:** 0

Seminar (3) Various topics in mathematics discussed. Three hours of lecture per week. Prerequisite: Consent of the instructor.

**College/School:** Col of Science, Engr & Tech**Department:** Department of Mathematics**MATH 1314 College Algebra (3 Credits)****Lecture:** 3

College Algebra (3) Concise overview of elementary algebra, including progressions, exponents, radicals, quadratic equations, binomial theorem, inequalities, absolute values, and mathematical induction. Three hours of lecture per week. Previously MATH 133.

**Prerequisite(s):** ( or or or TSI Exemption TAKS with a score of 2200 or TSI MATH Assessment with a score of 350 or or C-Better Math Resident Stu with a score of 2.00 or C-Better Math Transfer Stu with a score of 2.0) or ( and MATH 101 (may be taken concurrently) or MATH 131 or HCCM 131) or (TSI MATH Assessment with a score of 910 and Adult Basic Education MATH with a score of 6) or TSI MATH Assessment with a score of 950

**College/School:** Col of Science, Engr & Tech**Department:** Department of Mathematics**TCCN:** MATH 1314**MATH 1316 Plane Trigonometry (3 Credits)****Lecture:** 3

Definitions and relations of the six trigonometric functions, proofs of formulas, solutions of triangles, trigonometric identities and equations, inverse trigonometric functions, vectors, and applications related to these topics. The course is part of the preparation for MATH 241.

**College/School:** Col of Science, Engr & Tech**Department:** Department of Mathematics**MATH 1324 Math and Business and Econ I (3 Credits)****Lecture:** 3

Mathematics for Business and Economic Analysis (3) Presentation of mathematical theories and approaches as applied to business and economics. Three hours of lecture per week. Previously MATH 135. Prerequisites: MATH 131 or a satisfactory score on the assessment examination.

**Prerequisite(s):** ( or or or TSI Exemption TAKS with a score of 2200 or or C-Better Math Resident Stu with a score of 2.00 or C-Better Math Transfer Stu with a score of 2.00) or ( and MATH 101 or MATH 131 or HCCM 131) or TSI MATH Assessment with a score of 350 or (TSI MATH Assessment with a score of 910 and Adult Basic Education MATH with a score of 6) or TSI MATH Assessment with a score of 950

**College/School:** Col of Science, Engr & Tech**Department:** Department of Mathematics**TCCN:** MATH 1324**MATH 1325 Elements of Calculus (3 Credits)****Lecture:** 3

Limits and continuity, derivatives, graphing and optimization, exponential and logarithmic functions, antiderivatives, integration, applications to management, economics, and business. Prerequisites: MATH 135 or MATH 137 or by department consent. (The content level of MATH 138 is expected to be below the content level of Calculus I, MATH 241). Listed as MATH 1325 in the Texas Common Course Numbering System. (formerly MATH 135)

**Prerequisite(s):** (MATH 133 or MATH 1314 or MATH 135 or MATH 1324)**College/School:** Col of Science, Engr & Tech**Department:** Department of Mathematics**TCCN:** MATH 1325

**MATH 1332 Contemporary Mathematics I (3 Credits)****Lecture:** 3

Contemporary Mathematics is a course designed for liberal and fine arts, non-mathematics, and non-business majors. It will provide knowledge of the nature of mathematics as well as training in mathematical thinking and problem solving. Topics may include logic and mathematics reasoning, sets, problem solving, applications, networks, graphs, probability, statistics, geometry, mathematics of finance, and number theory. Three hours of lecture per week. Prerequisite: MATH 131 or satisfactory score on the assessment examination.

**Prerequisite(s):** ( or or or or TSI Exemption TAKS with a score of 2200 or or C-Better Math Resident Stu with a score of 2.0 or C-Better Math Transfer Stu with a score of 2.0) or ( and MATH 101 (may be taken concurrently) or MATH 131 or HCCM 131) or TSI MATH Assessment with a score of 350 or (TSI MATH Assessment with a score of 910 and Adult Basic Education MATH with a score of 6) or TSI MATH Assessment with a score of 950

**College/School:** Col of Science, Engr & Tech

**Department:** Department of Mathematics

**TCCN:** MATH 1332

**MATH 1333 Contemporary Mathematics II (3 Credits)****Lecture:** 3

Contemporary Mathematics is a course designed for liberal and fine arts, non-mathematics, non-science, and non business majors. It will provide knowledge of the nature of mathematics, as well as training in mathematical thinking and problem solving. Topics include statistics, probability, combinatorics, and game theory. Emphasis will be given to methods and models utilizing these topics in real world applications. Three hours of lecture per week. Pre-Requisites: MATH 132 and MATH 133 or by department consent. Listed as MATH 1333 in the Texas Common Course Numbering System.

**Prerequisite(s):** MATH 132 or MATH 133

**College/School:** Col of Science, Engr & Tech

**Department:** Department of Mathematics

**TCCN:** MATH 133

**MATH 1342 Elementary Statistics (3 Credits)****Lecture:** 3

Elementary Statistics (3) Basic statistics topics presented for students planning to work in health-related fields. Three hours of lecture per week. Prerequisites: MATH 133 and a passing score on the mathematics portion of the ASSET Examination. Listed as MATH 1342 in the Texas Common Course Numbering System.

**Prerequisite(s):** (MATH 133 or or or or TSI Exemption TAKS with a score of 2200 or TSI MATH Assessment with a score of 350 or or C-Better Math Resident Stu with a score of 2.00 or C-Better Math Transfer Stu with a score of 2.0) or ( and MATH 101 (may be taken concurrently) or MATH 131 or HCCM 131 or MATH 135 or MATH 132 or TSI MATH Assessment with a score of 910 and Adult Basic Education MATH with a score of 6) or TSI MATH Assessment with a score of 950

**College/School:** Col of Science, Engr & Tech

**Department:** Department of Mathematics

**TCCN:** MATH 1342

**MATH 1350 Fundamentals of Mathematics I (3 Credits)****Lecture:** 3

Sets, functions, logic, numeration theory, advanced definition perspectives, arithmetic operations (properties and algorithms), rational numbers, system of real numbers, and mathematical applications. Problem solving emphasized. Three hours of lecture per week. (Prerequisites: Grade of C or above in MATH 133/MATH 1314.)

**Prerequisite(s):** MATH 133 or MATH 1314

**College/School:** Col of Science, Engr & Tech

**Department:** Department of Mathematics

**TCCN:** MATH 1350

**MATH 1351 Foundations of Mathematics II (3 Credits)****Lecture:** 3

Basic concepts and methods of probability, statistics, and geometry, including discrete probability, random events, and conditional probability. Analysis of data, informational display, measurement, and geometry (as approached through similarity and congruence, coordinates, and transformations). Problem solving emphasized. Three hours of lecture per week. (Prerequisite: MATH 133/MATH 1314.)

**Prerequisite(s):** MATH 133 or MATH 1314

**College/School:** Col of Science, Engr & Tech

**Department:** Department of Mathematics

**TCCN:** MATH 1351

**MATH 2305 Discrete Mathematics (3 Credits)****Lecture:** 3, **Lab:** 0

A course designed to prepare math, computer science, and engineering majors for a background in abstraction, notation, and critical thinking for the mathematics most directly related to computer science. Topics include: logic, relations, functions, basic set theory, countability and counting arguments, proof techniques, mathematical induction, combinatorics, theory, and mathematical proof techniques. Prerequisite: Math 2313 or 2413 Calculus I(241)

**Prerequisite(s):** MATH 2313 or MATH 2413 or MATH 241

**College/School:** Col of Science, Engr & Tech

**Department:** Department of Mathematics

**MATH 2312 Precalculus Math (3 Credits)****Lecture:** 3

Precalculus Mathematics (3) Designed to prepare students for the study of MATH 241. Elementary functions that are differentiated and integrated in calculus stressed, including polynomial, rational, algebraic, exponential, logarithmic, and trigonometric functions. Three hours of lecture per week. Previously MATH 136. Prerequisite: Math 133 or Passing score on the mathematics portion of the ASSET Examination or satisfactory score on placement test.

**Prerequisite(s):** MATH 133 or MATH 1314

**College/School:** Col of Science, Engr & Tech

**Department:** Department of Mathematics

**TCCN:** MATH 2312

**MATH 2318 Linear Algebra (3 Credits)****Lecture:** 3

Introduces and provides models for application of the concepts of vector algebra. Topics include finite dimensional vector spaces and their geometric significance; representing and solving systems of linear equations using multiple methods, including Gaussian elimination and matrix inversion; matrices; determinants; linear transformations; quadratic forms; eigenvalues and eigenvector; and applications in science and engineering. (Prerequisite: MATH 2414)

**Prerequisite(s):** MATH 2414 or MATH 242

**College/School:** Col of Science, Engr & Tech

**Department:** Department of Mathematics

**MATH 2320 Differential Equations (3 Credits)****Lecture:** 3

Differential Equations (3) Important methods of solution of ordinary differential equations of the first order and of higher orders with applications to geometry and physics. Three hours of lecture per week.

**Prerequisite(s):** (MATH 242 or MATH 2414) and (MATH 243 or MATH 2415)

**College/School:** Col of Science, Engr & Tech

**Department:** Department of Mathematics

**MATH 2412 Accelerated Pre-Calculus (4 Credits)****Lecture:** 4, **Lab:** 0

Designed to prepare students for the study of Math 241. This course covers elementary functions including polynomial, rational, algebraic, exponential, logarithmic, and trigonometric functions. Four hours of lecture per week. Listed as Math 2412 in Texas Common Course Numbering System. Pre-/Co-Req TSI exempt of TSI Completed MATH 101

**Prerequisite(s):** (MATH 133 or MATH 1314)

**College/School:** Col of Science, Engr & Tech

**Department:** Department of Mathematics

**MATH 2413 Calculus & Analytic Geometry I (4 Credits)****Lecture:** 3, **Lab:** 2

Calculus and Analytic Geometry I (4) Inequalities, functions, graphs, straight lines, linear equations, limits, continuity, differentiation, maximum-minimum problems, mean value theorem, related rates, and indefinite integrals. Four hours of lecture per week. Prerequisites: MATH 133 and MATH 134 or MATH 136 or placement by examination. Listed as MATH 2413 in the Texas Common Course Numbering System.

**Prerequisite(s):** (MATH 136 or MATH 2312 or MATH 2412) or (MATH 133 or MATH 1314) and (MATH 134 or MATH 1316)

**College/School:** Col of Science, Engr & Tech

**Department:** Department of Mathematics

**TCCN:** MATH 2413

**MATH 2414 Calculus & Analytic Geometry II (4 Credits)****Lecture:** 3, **Lab:** 2

Calculus and Analytic Geometry II (4) Definite and indefinite integrals, techniques of integration, transcendental functions, and applications of the definite integral. Four hours of lecture per week. Prerequisite: MATH 241. Listed as MATH 2414 in the Texas Common Course Numbering System.

**Prerequisite(s):** (MATH 241 or MATH 2413)

**College/School:** Col of Science, Engr & Tech

**Department:** Department of Mathematics

**TCCN:** MATH 2414

**MATH 2415 Calculus & Analytic Geo III (4 Credits)****Lecture:** 4

Calculus and Analytic Geometry III (4) Sequences, infinite series, conic sections, polar coordinates, two-dimensional and three-dimensional vectors, parametric equations, partial differentiation, and multiple integrals. Four hours of lecture per week.

**Prerequisite(s):** (MATH 242 or MATH 2414)

**College/School:** Col of Science, Engr & Tech

**Department:** Department of Mathematics

**MATH 3338 Introduction To Probability (3 Credits)****Lecture:** 3

Introduction To Probability (3) This course introduces probability which forms the foundation for understanding statistics, randomness and uncertainty. This course covers discrete and continuous probability distributions, random variables and their distributions, cumulative distribution functions, expectation, variance and covariance. R will be used through out the course. Three hours of lecture per week.

**Prerequisites:** MATH 242.

**Prerequisite(s):** MATH 242

**College/School:** Col of Science, Engr & Tech

**Department:** Department of Mathematics

**MATH 3339 Statistics For Sciences (3 Credits)****Lecture:** 3

Statistics for Science(3) This course introduces theory and application for statistics learning techniques, including linear and logistic regression, classification and regression trees, random forests and neural networks. R programming will be used throughout the course.

**College/School:** Col of Science, Engr & Tech

**Department:** Department of Mathematics

**MATH 4332 Introduction to Analysis II (3 Credits)****Lecture:** 3

This is the second part of a two-semester course in Introduction to Real Analysis. Topics include real number system; sequences and series; limit, continuity and differentiation; the Riemann integral; sequences and series of functions; elementary metric space theory including compactness, connectedness and completeness; differentiation and integration of functions of several variables. (Prerequisite: MATH 339)

**Prerequisite(s):** MATH 339

**College/School:** Col of Science, Engr & Tech

**Department:** Department of Mathematics

**MATH 4377 Advanced Linear Algebra I (3 Credits)****Lecture:** 3

This course is intended for undergraduates to introduced student of mathematical proofs in Linear systems of equations, matrices, determinants, vector spaces and linear transformations, eigenvalues and eigenvectors. (Prerequisite: MATH 2318 (formerly MATH 250) and MATH 331) or Department Consent.

**Prerequisite(s):** (MATH 2318 or MATH 250) and MATH 331

**College/School:** Col of Science, Engr & Tech

**Department:** Department of Mathematics

**MATH 4378 Advanced Linear Algebra II (3 Credits)****Lecture:** 3

This course is intended for undergraduates as a continuation of MATH 4377, Determinants, eigenvalues, eigenvectors, and diagonalization, canonical forms, and inner product and norm, Gram-Schmidt process. (Prerequisite: MATH 4377) or Department Consent.

**Prerequisite(s):** (MATH 4377)

**College/School:** Col of Science, Engr & Tech

**Department:** Department of Mathematics